

Claims

1. A medical device comprising:
an elongate catheter including an external surface and at least one internal surface defining an internal lumen that extends longitudinally along at least a portion of the elongate catheter; and
a nonradial slit extending from the external surface to the at least one internal surface and into communication with the internal lumen.
2. A medical device according to claim 1, wherein the slit forms an included angle with a radial line between about 1 degree and about 179 degrees.
3. A medical device according to claim 1, wherein the slit forms an included angle with a radial line between about 10 degrees and about 40 degrees.
4. A medical device according to claim 1, wherein the slit forms an included angle with a radial line of about 30 degrees.
5. A medical device according to claim 1, wherein the catheter has a generally circular cross-section.
6. A medical device according to claim 1, wherein the catheter has a generally oval cross-section.
7. A medical device according to claim 1, wherein the catheter has a generally rectangular cross-section.
8. A medical device according to claim 1, wherein the slit is generally longitudinally disposed.
9. A medical device according to claim 1, wherein the slit is between about 0.06 and about 1.0 inches in length.
10. A medical device according to claim 1, wherein the slit is between about 0.12 and about 0.75 inches in length.
11. A medical device according to claim 1, wherein the slit is between about 0.15 and about 0.40 inches in length.

12. A medical device according to claim 1, wherein the internal lumen is eccentric with respect to the external surface.
13. A medical device according to claim 12, wherein the nonradial slit is disposed in a thickened wall portion of the catheter.
14. A medical device according to claim 1, wherein the slit is linear.
15. A medical device according to claim 1, wherein the slit is nonlinear.
16. A medical device according to claim 15, wherein the slit comprises at least one angle.
17. A medical device according to claim 15, wherein the slit is curved.
18. A medical device according to claim 17, wherein the slit has a radius of about 0.10 to about 0.50 inches.
19. A medical device according to claim 1, further comprising a second nonradial slit extending from the external surface to the at least one internal surface and into communication with the internal lumen.
20. A medical device according to claim 19, wherein the first and second slits are symmetrical about a radial line and are arranged so as to converge at a point external to the elongate catheter.
21. A medical device according to claim 19, wherein the first and second slits are symmetrical about a radial line and are arranged so as to diverge from a point external to the elongate catheter.
22. A medical device according to claim 5, further comprising a laminate disposed on the external surface and extending from the slit up to about 225 degrees from the slit.
23. A medical device according to claim 5, further comprising a laminate disposed on the external surface and extending from about 45 degrees from the slit up to about 225 degrees from the slit.
24. A medical device according to claim 19, wherein the elongate catheter defines a second lumen.

25. A medical device comprising:
an elongate catheter including an external surface and at least one internal surface defining an internal lumen that extends longitudinally along at least a portion of the elongate catheter;
a protuberance disposed on the elongate catheter; and
a nonradial slit extending from the external surface, through the protuberance to the at least one internal surface, and into communication with the internal lumen.
26. A medical device comprising:
an elongate catheter including an external surface and at least one internal surface defining an internal lumen that extends longitudinally along at least a portion of the elongate catheter;
a protuberance disposed on the elongate catheter; and
a slit disposed adjacent the protuberance and extending from the external surface to the at least one internal surface, and into communication with the internal lumen.
27. A medical device according to claim 26, wherein the slit is nonradial.
28. A medical device according to claim 25 or 27, wherein the slit forms an included angle with a radial line between about 1 degree and about 179 degrees.
29. A medical device according to claim 25 or 27, wherein the slit forms an included angle with a radial line between about 10 degrees and about 40 degrees.
30. A medical device according to claim 25 or 27, wherein the slit forms an included angle with a radial line of about 30 degrees.
31. A medical device according to claim 25 or 26, wherein the catheter has a generally circular cross-section.
32. A medical device according to claim 25 or 26, wherein the protuberance and slit are generally longitudinally disposed.
33. A medical device according to claim 25 or 26, wherein the slit is between about 0.06 and about 1.0 inches in length.

34. A medical device according to claim 25 or 26, wherein the slit is between about 0.12 and about 0.75 inches in length.

35. A medical device according to claim 25 or 26, wherein the slit is between about 0.15 and about 0.40 inches in length.

36. A medical device according to claim 25 or 26, wherein the protuberance is disposed on the external surface of the elongate catheter.

37. A medical device according to claim 25 or 26, wherein the protuberance is disposed on the at least one internal surface of the elongate catheter.

38. A medical device according to claim 25, further comprising:
a second protuberance disposed on the elongate catheter; and
a second nonradial slit extending from the external surface, through the second protuberance to the at least one internal surface, and into communication with the internal lumen.

39. A medical device according to claim 38, wherein the first and second slits are symmetrical about a radial line and are arranged so as to converge at a point external to the elongate catheter.

40. A medical device according to claim 38, wherein the first and second slits are symmetrical about a radial line and are arranged so as to diverge from a point external to the elongate catheter.

41. A medical device according to claim 38, wherein the first and second protuberances are disposed opposite each other.

42. A medical device according to claim 38, wherein the elongate catheter defines a second lumen.

521B
A2
43. A medical device comprising:
an elongate catheter including an external surface and at least one internal surface defining an internal lumen that extends longitudinally along at least a portion of the elongate catheter; and
a compound slit extending from the external surface to the at least one internal surface and into communication with the internal lumen.

44. A medical device according to claim 43, wherein the compound slit is disposed on a distal end of the elongate catheter.
45. A medical device according to claim 44, further comprising a collar disposed at the distal end of the catheter.
46. A medical device according to claim 43, wherein the compound slit is a tricuspid slit.
47. A medical device according to claim 43, wherein the compound slit is a T-shaped slit.
48. A medical device according to claim 43, wherein the compound slit is a cross-shaped slit.
49. A medical device according to claim 43, wherein the compound slit is a double T-shaped slit.
50. A medical device according to claim 43, wherein the catheter further comprises a second internal lumen that extends longitudinally along at least a portion of the elongate catheter and a second compound slit extending from the external surface to the at least one internal surface and into communication with the second internal lumen.
51. A medical device comprising:
an elongate catheter defining a first lumen that extends longitudinally along at least a portion of the elongate catheter;
a cap including an external surface and at least one internal surface and defining a second lumen, the cap disposed at a distal end of the elongate catheter; and
a nonradial slit that extends from the external surface of the cap to the at least one internal surface of the cap and into communication with the first and second lumens.
52. A medical device comprising:
an elongate catheter defining a first lumen that extends longitudinally along at least a portion of the elongate catheter;
a cap including an external surface and at least one internal surface and defining a second lumen, the cap disposed at a distal end of the elongate catheter; and
a compound slit that extends from the external surface of the cap to the at least one internal surface of the cap and into communication with the first and second lumens.

53. A medical device comprising:
- an elongate catheter including an external surface and at least two internal surfaces defining two internal lumens that extend longitudinally along at least a portion of the elongate catheter;
 - a first protuberance disposed on the elongate catheter;
 - a first slit disposed adjacent the first protuberance and extending from the external surface to one of the at least two internal surfaces, and into communication with the first internal lumen;
 - a second protuberance disposed on the elongate catheter; and
 - a second slit disposed adjacent the second protuberance and extending from the external surface to another of the at least two internal surfaces, and into communication with the second internal lumen.
54. A medical device according to claim 53, wherein the first and second slits are nonradial.
55. A medical device comprising:
- an elongate catheter including an external surface and at least two internal surfaces defining two internal lumens that extend longitudinally along at least a portion of the elongate catheter;
 - a first nonradial slit extending from the external surface to one of the at least two internal surfaces, and into communication with the first internal lumen; and
 - a second nonradial slit extending from the external surface to another of the at least two internal surfaces, and into communication with the second internal lumen.
56. A medical device comprising:
- an elongate catheter defining an open distal end and a first lumen that extends longitudinally from the open distal end along at least a portion of the elongate catheter;
 - a cap including a proximal portion, an external surface, and at least one internal surface, the cap defining a second lumen and at least one slot in the proximal portion, and disposed at the distal end of the elongate catheter; and
 - a slit that extends from the external surface of the cap to the at least one internal surface of the cap and into communication with the first and second lumens.

57. The medical device of claim 56, wherein the slit is nonradial.
58. The medical device of claim 56, wherein the slit is a compound slit.
59. The medical device of claim 56, wherein the open distal end of the catheter is collapsible.
60. The medical device of claim 56, wherein the catheter has a wall thickness that tapers down at the open distal end.

FOGHD:BTSEB60